

Field Evaluation of Water and Nitrate Flux Through the Root Zone in a Drip/Trickle Irrigated Vineyard

Project leader

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Objective

The primary objective of the study was to determine the extent to which nitrate flux below the root zone occurs for a chemigated, drip/trickle irrigated Thompson Seedless vineyards when fertilization and added water amounts at optimum levels.

Summary

Perennial crops that are grown with relatively wide row spacing logically appear to be situations that might lead to water and nutrient flux below the crop root zone. This is specially true on sandy soils where drip irrigation with chemigation concentrates a water and nutrient release in a relatively small part of the crop root zone that is expected to fully meet ET_c and crop nutrient needs. This study was conducted to determine the extent to which water and N movement below the root zone occurs for a chemigated/drip irrigated Thompson Seedless vineyards when fertilization and added water amounts at optimum levels. Soil of the UC Kearney Agricultural Center study location are primarily Hanford sandy loam.

The experiments included 1) establishing normal and usual conditions for 1.2 ha Thompson seedless vineyard by means of a uniformity study, 2) installing neutron probes, tensiometers and solution suction probes to characterize soil water retention transmission properties, 3) installing drip irrigation laterals and imposing irrigation and chemigation treatments, and 4) measuring water and N flux below the effective root zone. Season-long water flux below the root zone was only 23 mm. With measured N concentration in this quality of water, only 1.3 lbs. N/acre (1.5 kg N/ha) was moved below the effective root zone of the crop. The study clearly showed that N fertilization and irrigation to fully meet water and nutrient requirements of grape vineyards could be done without contaminating groundwater. Based on the comparisons of measured flow with factory flow specifications, three different buried drip systems did not experience root plugging for any of the comparative materials used during this study.